

EC1 Series

Bus type open loop stepper driver

User's manual V1.0.0

Applicable to EC1-530, EC1-570, and EC1-872

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1、Product brief introduction

1.1 Product overview

The EC1 Series bus-type open-loop stepper driver adopts the EtherCAT bus communication interface, integrating EtherCAT slave station technology, vector control technology, built-in micro-step technology, and adaptive filtering technology. It realizes real-time control and real-time data transmission of the stepper system, optimizing the performance of the stepper motor: it has excellent smoothness and ultra-low noise at medium and low speeds; the high-speed torque has been greatly enhanced, expanding the speed application range of the stepper motor; the smooth and precise pure sine current vector control technology effectively reduces motor heating.

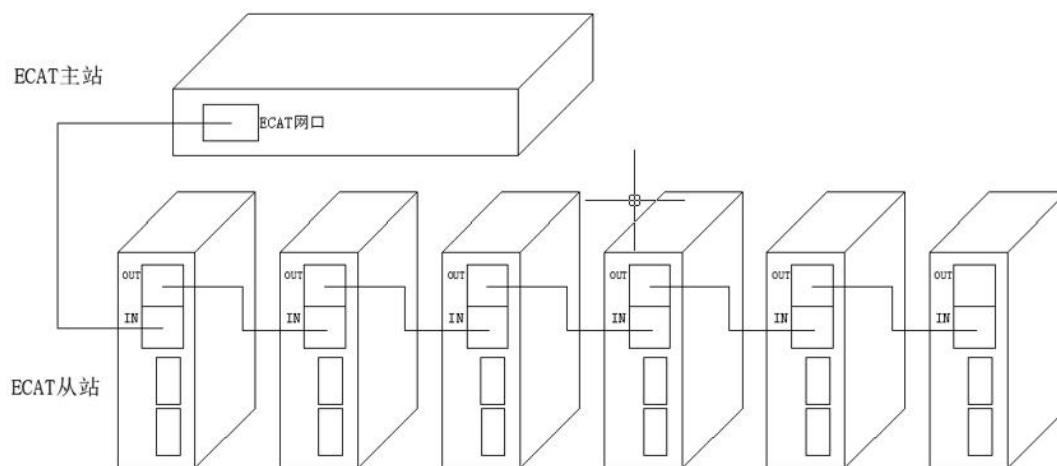
The EC1 Series bus-type open-loop stepper driver has perfectly supported multiple master station control systems such as Beckhoff, Omron, Keyence, HuaChuan, and XinJie, and has been widely applied in industries such as textiles, robots, lithium battery equipment, 3C electronics, new energy, photovoltaic equipment, medical equipment, and testing equipment.

1.2 Product feature

- The new generation of 32-bit RISC-V MCU features an extremely high cost performance, excellent stability, and superior noise and vibration performance.
- It adopts EtherCAT slave technology and supports CIA301 and CIA402 sub-protocols, as well as CSP, PV, PP, and HM modes.
- Users can set the current, subdivision, and lock-in current size through the EtherCAT bus or serial communication.
- It has built-in single-axis controller function: Users can set the synchronous position mode, speed mode, position mode, and return-to-origin mode through the bus.
- 3 channels of optically isolated programmable input interfaces, receiving external control signals to achieve driver limit, origin, emergency stop, probe, etc. functions.
- Built-in micro-subdivision.
- Built-in motor parameter setting.
- Can set any current reduction ratio when stationary.
- Has overvoltage and undervoltage protection functions.
- Excellent stability, low noise, and vibration performance.
- Supports position control, speed control, etc. modes.

- Pure sine current vector control effectively reduces motor heating.
- 1 channel of optically isolated programmable output interface, output driver status and control signals.
- Has arbitrary subdivision adjustment, allowing for arbitrary subdivision changes.
- Has excellent stability at low frequencies and small subdivisions.
- Voltage range: DC 24-50V

1.3 Networking scheme



Explain:

ECAT 主站: ethercat master station

ECAT 从站: ethercat slave station

ECAT 网口: ethercat network port

Figure 1 Bus-type Stepping Network Scheme

2、Electrical, mechanical and environmental indicators

2.1 Mechanical installation drawing

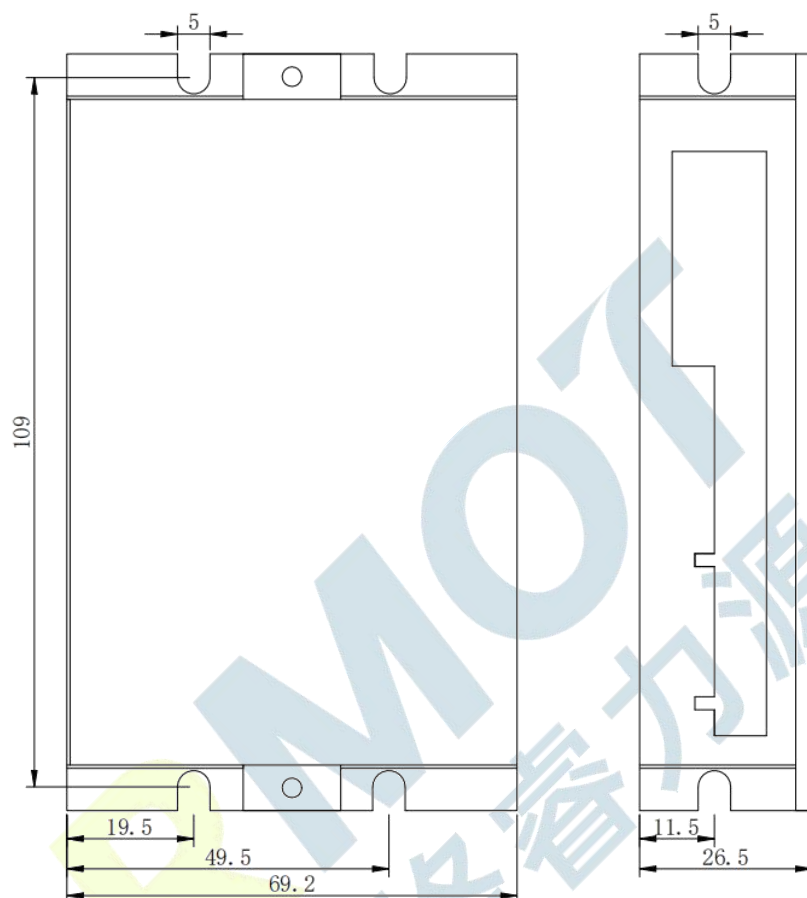


Figure 2.1 Installation dimensions (unit: mm)

2.2 Installation precautions

- 1) The reliable operating temperature of the driver is usually within 50 °C, and the operating temperature of the motor is within 80 °C.
- 2) When it is recommended to use, choose the automatic half-current mode, that is, when the motor stops, the current is automatically reduced by half to reduce the heat of the motor and the driver;
- 3) When installing the driver, please use the side installation, and make the driver bottom surface to form a strong air convection; When necessary, a fan is installed near the driver in the machine to form air convection, auxiliary drive heat dissipation, and ensure that the driver works within a reliable operating temperature range.

2.3 Specification List

Parameter	EC1-530	EC1-570	EC1-872
Peak current	0.1~3.0A	0.1~7.0A	0.1~7.2A
Match motor	20/28/35/42	57/60	57/60/86
input voltage	24~48V	24~48V	24~80V
Digital input	Home, Positive limit, Negative limit, Fast stop, Probe		
Digital output	Alarm output, Position output, Motor enable output, Free output		

2.4 Use environment and parameters

Type of cooling		Natural cooling, fan cooling
Service environment	Occasion	Can not be placed next to other heating equipment, to avoid dust, oil mist, corrosive gases, humidity is too large and strong vibration places, flammable gases and conductive dust are prohibited.
	Temperature	0~50°C
	Humidity	40~90%RH
	Vibration	10~55Hz/0.15mm
Storage temperature		-20°C~65°C

3、Driver Interface and Wiring Description

3.1 Introduction to Driver Interface

Table 3.1 Driver Interface

Name		Function	Explain
ECAT IN/OUT		ETHERCAT Communication Port	ECAT IN ECAT OUT
IN/OUT	X0	Input Port	Low-speed digital signal input interface
	X1		
	X2		
	XCOM	Single-ended input port common terminal: Positive logic valid	+24V
	Y0	Output Port	Low-speed digital signal output interface
	YCOM	Single-ended output port common terminal compatible with common anode and common cathode	Compatible with both common-negative and common-positive connection methods
MOTOR	A+	Motor Port	Wiring port of two-phase stepping motor
	A-		
	B+		
	B-		
VDC	VDC	Power Port	DC20-50V
	GND		

3.2 Indicator light

The indicator lights of the EC1 Series Bus Type Open Loop Stepper Driver User Manual are recessed surface-mounted LEDs. There is a small circular hole on the driver through which the status of the indicator lights can be observed. The basic definition is as shown in Table 3.2.

Table 3.2 Definition of Indicator Lights

Name	Describe	Function	Explain
ALM	Red LED	Enable, movement, parameter saving, factory reset, alarm, etc. indications	When the power is on normally, the red light goes out. When the device is not enabled, the green light flashes slowly for 1000ms. When enabled, the green light remains on constantly. During movement, the green light flashes rapidly for 250ms.
PWR	Green LED		When saving parameters, restoring factory settings, or when an abnormality occurs with the device, the red and green lights flash to indicate an alarm. The flashing

		pattern can be found in Chapter 7.
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3.3 Interface Communication

The communication interface of EC1 Series Bus Type Open Loop Stepper Driver User Manual adopts a modular standard RJ45 socket, as shown in Figure 3.1. The left port is the input port, which is connected to the output port of the previous driver; the right port is the output port, which is connected to the input port of the next driver.

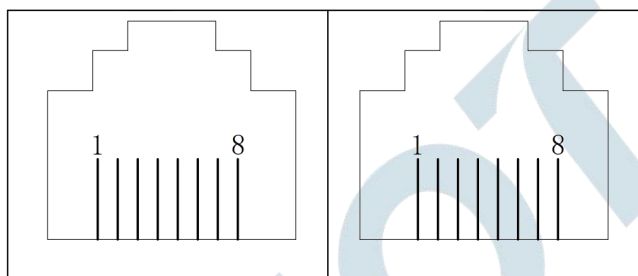


Figure 3.1 Schematic Diagram of the Integrated RJ45 Interface

3.4 Input signal interface

The EC1 Series Bus Type Open Loop Stepper Driver User Manual provides an input interface with a programmable interface protected by photoelectric isolation.

The input interface adopts the common anode connection method and only supports NPN wiring. An external +24V power supply is required. To ensure the reliable conduction of the internal optocoupler in the driver, it is required that the driving current at the controller end be at least 10mA. The pulse width of the input level needs to be greater than 10ms; otherwise, the driver may not respond normally. The wiring diagram is shown in Figure 3.2.

After the driver is powered on normally, the effective level of the input interface is initially set to the rising edge or high level by default. Users can also configure the initial default effective level of the input interface at the master station to be the falling edge or low level. Specific configuration can be referred to in Section 4.2 regarding the definition and description of the registers.

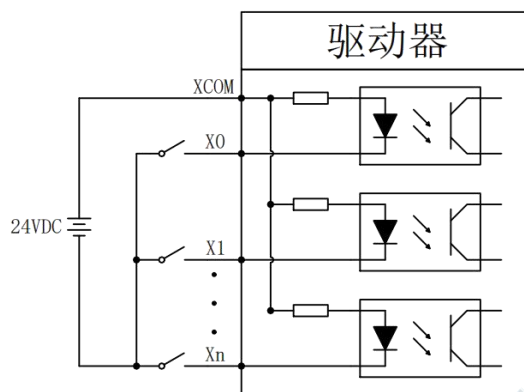


Figure 3.2 Schematic Diagram of Input Signal Connection

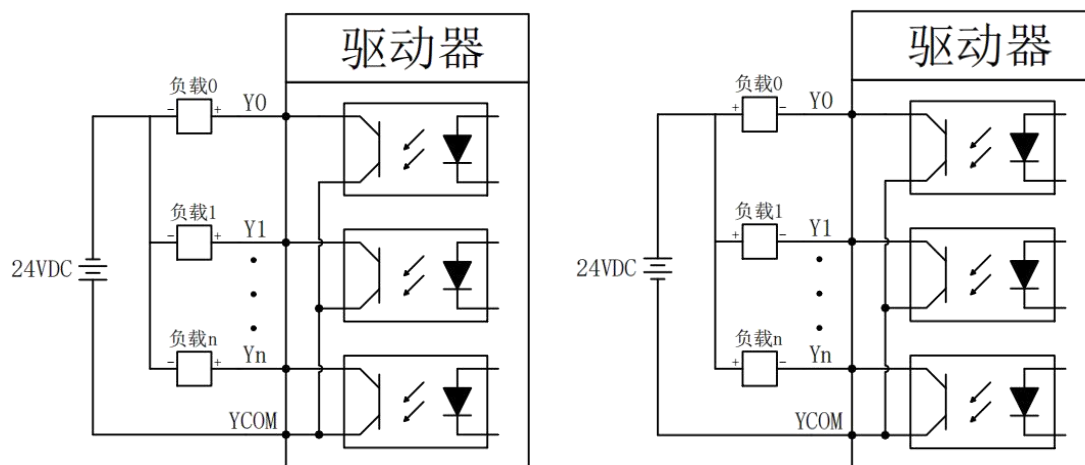
Note: For the EC1 Series Bus Type Open Loop Stepper Driver User Manual, the default input interface supports 24V signal. If the user requires a 5V signal for control, they need to communicate with our company's business or technical staff for the modification.

3.5 Output signal interface

The EC1 Series Bus Type Open Loop Stepper Driver User Manual provides a programmable interface with an output that is optically isolated.

The output interface is compatible with both common cathode and common anode connection methods, supporting both NPN and PNP wiring methods, and can support active master controllers with high and low levels. After the driver is powered on normally, the initial default state of the output interface is normally open. Users can also configure the initial default state of the output interface to be normally closed through the master station. Specific configurations can be referred to in Section 4.2 regarding the definitions and descriptions of the registers.

The following figure is a wiring diagram of the output signal interface:



Explain:

负载 0: external loading 0

负载 1: external loading 1

负载 2: external loading 2

Figure 3.3 Schematic Diagram of Common Anode
Connection for Output Signal

Figure 3.4 Schematic Diagram of Common Cathode
Connection for Output Signal

4、Parameter Description and Settings

4.1 All Parameter

4.1.1 Communication Parameter

Index	Sub-Index	Name	Explanation	Type	Attribute	Default Value
0x1000	0	Device type	Consistent with the CIA rules	UINT32	RO	0x04020192
0x1001	0	Error register		UINT8	RO	0
0x1010	00	The number of sub-indexes	..	UINT16	RO	4
	01	Save all parameters	Save Command: 0x65766173	UINT32	RW	0
	02	Save communication parameters	ditto	UINT32	RW	0
	03	Save the manufacturer parameters	ditto	UINT32	RW	0
	04	Save motion parameters	ditto	UINT32	RW	0
0x1011	0	The number of sub-indexes	..	UINT16	RO	4
	01	Restore the factory values of all parameters	Read Command: 0x64616F6C	UINT32	RW	0
	02	Restore the factory values of communication parameters	ditto	UINT32	RW	0
	03	Restore the factory values of the manufacturer's parameters	ditto	UINT32	RW	0
	04	Restore the factory values of the motion parameters	ditto	UINT32	RW	0
0x1018	00	The number of sub-indexes	..	UINT16	RO	4
	01	Manufacturer ID		UINT32	RO	0xAB5
	02	Product code		UINT32	RO	0x1010
	03	modified frequency modulation encoding		UINT32	RO	0
	04	serial number		UINT32	RO	0
0x1600	00	The number of sub-indexes	The number of the PDO default mapping object	UINT16	RW	2
	01-12	RXPDO Mapping object Group 1	The default RXPDO mapping object	UINT32	RW	..
0x1601	00	The number of sub-indexes	The number of the PDO default mapping object	UINT16	RW	6

	01-12	RXPDO Mapping object Group 2	The default RXPDO mapping object	UINT32	RW	..
0x1602	00	The number of sub-indexes	The number of the PDO default mapping object	UINT16	RW	5
	01-12	RXPDO Mapping object Group 3	The default RXPDO mapping object	UINT32	RW	..
0x1603	0	The number of sub-indexes	The number of the PDO default mapping object	UINT16	RW	7
	01-12	RXPDO Mapping object Group 4	The default RXPDO mapping object	UINT32	RW	..
0x1A00	0	The number of sub-indexes	The number of the PDO default mapping object	UINT16	RW	6
	01-12	TXPDO Mapping object Group 1	The default TXPDO mapping object	UINT32	RW	..
0x1A01	0	The number of sub-indexes	The number of the PDO default mapping object	UINT16	RW	5
	01-12	TXPDO Mapping object Group 2	The default TXPDO mapping object	UINT32	RW	..
0x1C00	00	The number of sub-indexes	..	UINT16	RO	4
	01	Email output type	..	UINT8	RO	1
	02	Email input type	..	UINT8	RO	2
	03	Process data output type	..	UINT8	RO	3
	04	Process data input type	..	UINT8	RO	4
0x1C12	0-04	PXPDO allocation	..	UINT16	RW	0x1600
0x1C13	0-02	TXPDO allocation	..	UINT16	RW	0x1A00
0x1C32	0-0A	RXPDO administrative parameters	..	UINT16	RO	..
0x1C33	0-0A	TXPDO administrative parameters	..	UINT16	RO	..

4.1.2 Manufacturer-defined parameters

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2000	00	Slave station address	R/W/S	UINT16	0~65535	1	-

Set the slave address by yourself through the serial port. Pay attention to the setting of 2001H

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2001	00	Sourced from the station address	R/W/S	UINT16	0~1	0	-

0: Derived from the address allocated by the main station;
1: Source: 2000H setting address;

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2002	01	Driver hardware version	RO	UINT16	0~65535	-	-

For example, 10, the version is V1.0

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2002	02	Driver software version	RO	UINT16	0~65535	-	-

For example, 100, the version is V1.0.0

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2002	03	Version of the driver manual	RO	UINT16	0~65535	-	-

For example, 100, the version is V1.0.0

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2003	01	Minimum synchronization period	RO	UINT16	0~65535	1000	us

The minimum synchronization period allowed by the drive

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2003	02	Maximum synchronization period	RO	UINT16	0~65535	4000	us

The maximum synchronization period allowed by the drive

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2003	03	Current synchronization cycle	RO	UINT16	0~65535	-	us

The maximum synchronization period allowed by the drive

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2004	00	Real-time value of busbar voltage	RO	UINT16	0~65535	-	0.1V
The bus voltage value input to the driver							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2005	01	The effective value of the actual operating current	RO	UINT16	0~65535	-	mA

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2005	02	The actual real-time value of phase A current	RO	UINT16	0~65535	-	mA

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2005	03	The actual real-time value of Phase B current	RO	UINT16	0~65535	-	mA

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2100	00	Selection of open and closed loop modes	RW	UINT16	0~1	0	-
0 represents an open loop and 1 represents a closed loop. (This product only supports open loops. If this parameter is changed, it will be invalid.)							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2101	00	The running direction	RW	UINT16	0~1	0	-
0 is counterclockwise; 1 is clockwise (facing the motor shaft)							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2102	00	Subdivision Presets	RW	UINT16	2000~60000	10000	P

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2103	00	Motor model selection	RW	UINT16	0~65535	0	-

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2104	00	Over-range parking mode	RW	UINT16	0~65535	0	-

Bit 0: Emergency stop mode: 0 Emergency stop; 1: Invalid;
 Bit 1: Positive and negative hard limit over travel ban functions: 0 effective; 1: Invalid;
 Bit 2: Plus or minus the soft limit over travel ban functions: 0 effective; 1: Invalid;

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2105	00	Upper computer control	RW	UINT16	0~1	0	-

0: The upper computer control is invalid;
 1: The upper computer control is effective;

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2300	00	Open-loop peak current setting	RW	UINT16	400~4500	3000	mA

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2301	01	Open-loop locking and rate reduction time	RW	UINT16	1~1000	500	ms

The delay time for entering rate reduction in the locked state

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2301	02	Percentage of rate reduction in open-loop locking	RW	UINT16	1~100	50	%

In the locked state, the current of the lock motor is reduced to a few percent of the operating current

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2302	01	The time for opening the ring and electrically locking the shaft	RW	UINT16	0~2000	500	ms

The time for locking the shaft after the driver is powered on

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2302	02	Selection of the electric lock shaft on the open ring	RW	UINT16	0~1	0	-

1 Enable soft start, 0 do not enable soft start

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2303	01	Open-loop current loop self-tuning enable	RW	UINT16	0~1	0	-
0 on, 1 off							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2303	02	Open loop current loop KP proportion adjustment	RW	UINT16	0~500	100	%

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2303	03	Open loop current loop KI proportion adjustment	RW	UINT16	0~500	100	%

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2304	01	Open loop gain can make current loop lock machine	RW	UINT16	0~1	0	-
0 on, 1 off							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2304	02	Open-loop current loop lock machine gain KP adjustment ratio	RW	UINT16	0~500	100	%

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2304	03	Open-loop current loop lock machine gain KI adjustment ratio	RW	UINT16	0~500	100	%

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2305	00	Open-loop algorithm selection	RW	UINT16	0~65535	0	-
Bit 0 : 0-Traditional sine wave driving algorithm 1-FOC algorithm							

Bit 1 : 0-Interpolation pulse

1-Acceleration and deceleration pulses

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2306	01	Intermediate frequency resonance suppression mark	RW	UINT16	0~1	1	-
1 Enable, 0 disable							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2306	02	Intermediate frequency resonance suppression coefficient percentage	RW	UINT16	0~500	100	%
The adjustment percentage of the medium-frequency oscillation suppression coefficient K							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2306	03	Starting speed of medium-frequency resonance	RW	UINT16	1~2000	240	rpm
Set the initial velocity V1 of medium-frequency oscillation							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2306	04	Medium-frequency resonance turning speed	RW	UINT16	1~2000	720	rpm
Set the medium-frequency oscillation turning point velocity V2							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2306	05	Motor winding resistance value	RW	UINT16	0~500	100	%
Percentage adjustment of motor winding resistance value							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2307	01	Open-loop proportional gain adaptive adjustment enabled	RW	UINT16	0~1	1	-
1 Enable, 0 disable							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2307	02	Open-loop proportional gain	RW	UINT16	0~5000	100	0.1%

		adaptive initial proportional adjustment					
Open-loop proportional gain adaptively adjusts the initial ratio to the thousandths ratio. Such as: setting value is 625, then the corresponding open loop proportional gain adaptive initial ratio of 0.625 times							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2307	03	Open-loop proportional gain adaptive starting speed V1	RW	UINT16	1~2000	360	rpm

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2307	04	Open-loop proportional gain adaptive turning speed V2	RW	UINT16	1~2000	720	rpm

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2307	05	Open loop proportional gain adaptive clipping	RW	UINT16	0~500	100	%
Open-loop proportional gain adaptive limiting percentage							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2308	01	Open loop current adaptive adjustment can make	RW	UINT16	0~1	1	-
1 Enable, 0 disable							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2308	02	Open loop current adaptive starting speed V1	RW	UINT16	1~2000	360	rpm

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2308	03	Open loop current adaptive turning speed V2	RW	UINT16	1~2000	720	rpm

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2308	04	Open loop current adaptive clipping	RW	UINT16	0~500	120	%
The maximum limit adjustment percentage of the open-loop current adaptive regulation							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2700	00	Input IO status	RW	UINT16	0~65535	-	-
Bit0 parallelism X0 Bit1 parallelism X1 Bit2 parallelism X2 ...							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2701	00	Input IO polarity configuration	RW	UINT16	0~65535	-	-
0 remains unchanged and 1 is reversed; Bit0 parallelism X0 Bit1 parallelism X1 Bit2 parallelism X2 ...							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2702	01~03	Input IO function selection	RW	UINT16	0~65535	-	-
0x2702:01, 0x2702:02, 0x2702:03, The default values are in sequence: 4, 2, 1; 1: Home 2: Position Limit 4: Negative Limit 8: Fast Stop 16: Probe 1 32: Probe 2 ...							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2703	01~03	Input the digital IO port X0 to X3 filtering time	RW	UINT16	0~5000	1000	ms

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2704	00	Output port polarity configuration	RW	UINT16	0~65535	0	-
1 high is valid, 0 low is valid; Bit0 parallelism Y0							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2705	01	Output digital IO mouth Y0 function configuration	RW	UINT16	0~65535	16	-
1: Alarm; 2: In place; 16: Free output (achieved by writing 0x60FE. For details, please refer to 0x60FE); 32: Motor enable output;							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2706	00	Fault detection enable configuration	RW	U16	0~65535	15	-
1: Shield this fault detection; 0: Enable corresponding fault detection; Bit0: Over Current Bit1: Over Voltage Bit2: EEPROM Bit3: Command over speed Bit11: Operational amplifier failure							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2707	01~09	Fault List 0-9	RW	UINT16	0~65535	-	-
Historical alarm list							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2708	00	Clear the fault record enable bit	RW	UINT16	0~1	0	-
1. Clear the current alarm list. After clearing is completed, reset it to 0.							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x2709	00	Clear the current fault enable bit	RW	UINT16	0~1	0	-
Clear the current alarm. After the clearing is completed, reset it to 0.							

4.1.3 CIA402 parameters

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x603F	00	Fault code	RO P	UINT16	0~65535	0	-

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x6040	00	Control word	RW P	UINT16	0~65535	-	-

Bit0: Start
 Bit1: Voltage output
 Bit2: Quick stop
 Bit3: Allow operation
 Bit4: depends on the operation mode, PP (new position point), PV (invalid), HM (start motion), CSP (invalid)
 Bit5: Depending on the operation mode, PP (immediate trigger), PV (invalid), HM (invalid), CSP (invalid)
 Bit6: depends on the operation mode, PP (absolute/relative), PV (invalid), HM (invalid), CSP (invalid)
 Bit7: Error reset
 Bit8: Pause
 Bit9~15: -

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x6041	00	State word	RO P	UINT16	0~65535	-	-

Bit0: Ready to start
 Bit1: Start
 Bit2: Allow operation
 Bit3: Error
 Bit4: Voltage output
 Bit5: Stop quickly
 Bit6: Not started
 Bit10: Position reached
 Bit11: The limit is valid
 Bit12: depends on the operation mode
 Bit13: depends on the operation mode
 Bit7~9、14~15: -

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x605A	00	Fast stop code	RW P	UINT16	0~65535	0	-

0: Invalid
 1: Emergency stop allowed

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x6060	00	Control mode	RW P	UINT8	8	0	-

1: PP (Position mode)
 3: PV (speed mode)

6: HM (return to origin mode)

8: CSP (Circular Synchronous Position Mode)

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x6061	00	Control mode display	RO P	UINT8	0~255	0	-
Query the status of 0x6060;							
1: PP (Position mode)							
3: PV (speed mode)							
6: HM (return to origin mode)							
8: CSP (Circular Synchronous Position Mode)							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x6062	00	Internal location command	RO P	INT32	-2147483647 ~2147483647	0	Pulse

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x6064	00	Current actual location	RO P	INT32	-2147483647 ~2147483647	0	Pulse

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x606B	00	Internal speed command	RO P	INT32	-2147483647 ~2147483647	0	Pulse/s

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x606C	00	Current actual speed	RO P	INT32	-2147483647 ~2147483647	0	Pulse/s

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x607A	00	target location	RW P	INT32	-2147483647 ~2147483647	0	Pulse
Set the total number of pulses running in CSP (synchronous position mode) and PP (position mode)							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x607C	00	offset location	RW P	INT32	-2147483647 ~2147483647	0	Pulse
Set the origin offset for HM (Return to Origin mode)							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
--------	-----------	------	-----------	------	-------	---------	------

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x607D	01	Maximum forward stroke	RW P	UINT32	0~2147483647	0	Pulse

Maximum forward stroke of motor movement;
When Bit0 of 0x2104 is enabled, the limit stop is activated, and Bit2 is enabled to activate the soft limit. When the maximum forward travel is exceeded, the motor stops in the forward direction, and the reverse motion is normal.

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x607D	02	Reverse maximum travel	RW P	UINT32	0~2147483647	0	Pulse

Maximum stroke of motor movement in reverse direction;
When Bit0 of 0x2104 is enabled, the limit stop is activated, and Bit2 is enabled to activate the soft limit. When the maximum reverse travel is exceeded, the motor stops in reverse, and the forward motion is normal.

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x6080	00	Maximum speed of the motor	RW P	INT32	0~3000	3000	rpm

Set the maximum speed at which the motor runs

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x6081	00	Profile speed	RW P	INT32		0	Pulse/s

Set the maximum speed of PP (position mode) and PV (speed mode)

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x6082	00	starting velocity	RW P	INT32		0	Pulse/s

Set the starting and stopping speeds of PP (position mode) and PV (speed mode)

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x6083	00	accelerated speed	RW P	INT32		0	Pulse/s ²

Set the acceleration of PP (position mode) and PV (speed mode)

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x6084	00	deceleration speed	RW P	INT32		0	Pulse/s ²

Set the deceleration of PP (position mode) and PV (speed mode)

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x6085	00	Stop and reduce speed	RW P	INT32		0	Pulse/s ²

Set the emergency stop deceleration mode for PP (position mode), PV (speed mode) and HM (return to origin mode)

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x6098	00	The back-to-origin method	RW P	INT32		0	Pulse/s ²

The current values that can be set for the return to origin mode are: 17~30,35,37; see the description in Chapter "5.5"

Return to Origin Mode Method"

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x6099	01	Find the origin speed 1	RW P	INT32		50000	Pulse/s
HM (return to origin mode) find the origin speed 1: high speed find the origin							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x6099	02	Find the origin speed 2	RW P			25000	Pulse/s
HM (return to origin mode) find the origin speed 2: low speed to find the origin							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x609A	00	Add or subtract acceleration from the origin	RW P			25000	Pulse/s ²
HM (return to origin mode) return to origin acceleration and deceleration							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x60B8	00	Probe control word	RW P			0	-
Bit 0: Probe 1 enabled 0 off 1 on Bit 1: Probe 1 mode 0 single 1 continuous Bit 2~3 : - Bit 4: Probe 1 is triggered by the rising edge Bit 5: Probe 1 is triggered by the falling edge Bit 6~7 : - Bit 8: Probe 2 enables 0 to turn off and 1 to turn on Bit 9: Probe 2 mode 0 single 1 continuous Bit 10~11: - Bit 12: Probe 2 rising edge trigger Bit 13: Probe 2 is triggered by the falling edge Bit 14~15: -							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x60B9	00	Probe status word	RO P			0	-
Bit 0: Probe 1 in action Bit 1: The probe 1 rising edge trigger is completed Bit 2: The probe 1 is triggered to complete the falling edge Bit 3~7 : - Bit 8: Probe 2 in action Bit 9: The rising edge of probe 2 is triggered to complete Bit 10: The probe 2 falling edge trigger is completed							

Bit 11~15 : -Bit 11~15 : -

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x60BA	00	Probe 1 rises to latch the value	RO P			0	-
Probe 1 rises to the position where the latch is locked							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x60BB	00	Probe 1 drops along the latch value	RO P			0	-
Probe 1 drops to the position where the latch is locked							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x60BC	00	Probe 2 rises to latch the value	RO P			0	-
Probe 2 rises to the position where the latch is locked							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x60BD	00	Probe 2 drops along the latch value	RO P			0	-
Probe 2 drops to the position where the latch is locked							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x60D5	00	Probe 1 rises and latches count value	RO P			0	-
Count the number of times the rising edge of probe 1 is latched							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x60D6	00	Probe 1 drops and latches count value	RO P			0	-
Count the number of times the falling edge of probe 1 is latched							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x60D7	00	Probe 2 rises and latches count value	RO P			0	-
Count the number of times the rising edge of probe 2 is latched							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x60D8	00	Probe 2 drops and	RO P			0	-

		latches count value					
Count the number of times the falling edge of probe 2 is latched							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x60FD	00	Enter the IO state	RO P			0	-
Bit0: negative limit Bit1: positive limit Bit2: origin Bit23: Stop Bit26: Probe 1 Bit27: Probe 2 Bit3~22,24~25,28~31 are retained							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x60FE	01	Physical output is enabled	RW P			0	-
0: invalid output; 1: valid output; Bit0: Port Y0 output is enabled Bit1-Bit15: Reserved							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x60FE	01	Physical output enabled	RW P			1	-
0: output disabled; 1: output enabled; Bit0: Port Y0 output enable Bit1-Bit15: Reserved							

Object	Sub-index	Name	Attribute	Type	Range	Default	Unit
0x60FF	00	Target speed	RW P			1	-
Set the maximum speed at which PV (speed mode) can be operated							

4.2 IO function configuration

4.2.1 Input signal

The functions of the input ports include positive limit signal, negative limit signal, origin signal, emergency stop signal, probe 1/2 trigger, and each input port function can be selected as one of them through Object 0x2702.

The following table describes the default input functions and Settings of X0-X2.

Input port	Default function	Object	Default value	IO port status query Dictionary of objects used 1	IO port status query Dictionary of objects used 2
X0	Negative limit	0x2702:01	4	0x60FD-Bit0	0x2700-Bit0
X1	Positive limit	0x2702:02	2	0x60FD-Bit1	0x2700-Bit1
X2	Origin signal	0x2702:03	1	0x60FD-Bit2	0x2700-Bit2

Brief description:

- (1) 2702:01 indicates Object 0x2702, sub-index 01 register; others are the same;
- (2) The status of the input port can be queried through the Object 0x60FD. The specific Bit changes of 0x60FD depend on the selection of input functions. For details, please refer to the Object 0x60FD.

4.2.2 Output signal

The functions of the output ports include alarm output, position output, and master station control output (user-defined). Each output port function can be selected as one of them through Object 0x2705. The following table describes the default output functions and Settings of Y0.

Output port	Default function	Function selects Object	Function selects the default setting value of the Object
Y0	Motor enable output	0x2705:01	32

The following table shows which setting corresponds to each output function, using the Y0 port as an example.

Y0 port function selection	Function selection position	Function selects the default setting value of the Object
Alarm output	0x2705:01-Bit0	1
Output at the right place	0x2705:01-Bit1	2
The main station controls the output	0x2705:01-Bit4	16
Motor enable output	0x2705:01-Bit5	32

The Object related to the output port function configuration is listed in the following table. Refer to section 3.1 All Parameters for details.

output port	Polarity configuration	Function selection control	Physical output is on	Physical output enabled
Y0	0x2704-Bit0	0x2705:01	0x60FE:01-Bit0	0x60FE:02-Bit0

For example, if Y0 is set to the custom output function, the setting steps are as follows:

- (1) Set the value of sub-index 01 of 0x2705 to 16 (user-defined output function);
- (2) Set 60FE: 01 and 60FE: 02 to 1, then Y0 output signal;

5、Commonly used function

5.1 Parameter saving and factory reset

Writing the command 0x65766173 to the sub-index corresponding to 0x1010 can save the corresponding category parameters to the EEPROM. Writing the command 0x64616f6c to the sub-index corresponding to 0x1011 can restore the factory Settings of the corresponding category parameters. After writing the save command, do not immediately turn off the power. Especially when saving all parameters, wait for the "red indicator light" to go out before cutting off the power to ensure that all parameters are successfully saved.

Function	Object	Command	Success Return
Save all parameters	0x1010:01	0x65766173	1
Save communication parameters	0x1010:02	0x65766173	1
Save the parameters defined by the manufacturer	0x1010:03	0x65766173	1
Save the parameters of the Cia402 series	0x1010:04	0x65766173	1
Restore all series parameters	0x1011:01	0x64616f6c	1
Restore communication parameters	0x1011:02	0x64616f6c	1
Restore the parameters defined by the manufacturer	0x1011:03	0x64616f6c	1
Restore the parameters of the Cia402 series	0x1011:04	0x64616f6c	1

5.2 Control word and status word bit definitions

5.2.1 0x6040 Control word

Bit	0	1	2	3	4-6	7	8	9-15
Function	Switch on	Enable voltage	quick stop	Enable operation	Operation mode specific	Fault reset	Halt	-

Supplementary explanations for other bits:

Bit 2: The rapid stop trigger logic is valid at 0. Note to distinguish it from other trigger logics.

Bit 7: Error reset trigger logic is valid for the rising edge.

Bit 5: Immediate trigger trigger logic is valid for the rising edge

5.2.2 0x6041 status word

Bit	0	1	2	3	4	5	6	9	11	7、8、10..
Function	ready to switch on	switched on	operation enabled	fault	voltage enabled	quick stop	switch on disabled	remote	internal limit	The pattern is relevant

									active	
--	--	--	--	--	--	--	--	--	--------	--

Supplementary explanation for other bits:

Bit 4: When the drive is powered on, bit 4 will be set.

Bit 5: Quick stop activation is only effective under logic 0, which is opposite to the logic of other bits.

Bit 9: Remote, displays the status of the communication status machine. When it is below ProOP, it is 0. At this time, the command of the control word (6040h) cannot be executed. Bit 11: Limit. It is set only when the hardware limit is valid.

Bit 8: Abnormal stop, which is generally effective under hardware limit, deceleration stop and rapid stop trigger states.

Bit 12: Follow the master station. In CSP, if the drive is not enabled or no longer follows the master station's instructions, this position is 0. A 10:15 while setting, said the origin have been found

5.3 Control mode and dictionary of associated objects

Control model	Index + sub-index	Name	Data type	Read and write permissions	Unit
Synchronous Positioning Mode (CSP)	0x6040	control word	UINT16	RW	-
	0x607A	target location	INT32	RW	Pulse
	0x6041	status word	UINT16	RO	-
	0x6064	physical location	INT32	RW	Pulse
	0x606C	actual velocity	INT32	RW	Pulse/s
position mode (PP)	0x607A	target location	INT32	RW	Pulse
	0x6081	maximum speed	INT32	RW	Pulse/s
Speed mode (PV)	0x60FF	Target speed	INT32	RW	Pulse/s
Speed mode position mode for public use	0x6040	control word	UINT16	RW	-
	0x6083	accelerated speed	INT32	RW	Pulse/s ²
	0x6084	deceleration	INT32	RW	Pulse/s ²
Return to origin mode (HM)	0x6040	control word	UINT16	RW	-
	0x6098	Method of returning to zero	UINT8	RW	-
	0x6099:01	Find the origin speed 1	INT32	RW	Pulse/s
	0x6099:02	Find the origin speed 2	INT32	RW	Pulse/s
	0x609A	Origin acceleration	INT32	RW	Pulse/s ²
	0x607C	Origin shift	INT32	RW	Pulse
There are PV, PP and HM modes	0x6041	status word	UINT16	RO	-
	0x6064	physical location	INT32	RW	Pulse
	0x606C	actual velocity	INT32	RW	Pulse/s
Other associated parameters	0x60FD	digital input	UINT16	RO	-
	0x603F	Latest error code	UINT16	RO	-
	0x6060	Operation mode setting	UINT8	RW	-
	0x6082	Take-off speed	INT32	RW	Pulse/s
	0x6085	Stop and reduce speed	INT32	RW	Pulse/s ²
	0x6061	Operation mode status	UINT8	RO	-

Regardless of the control mode used to manage the slave station, it involves reading and writing operations on two object dictionaries: 6040H (control word) and 6041H (status word). The master and slave stations use these two object dictionaries as transmission media to implement command issuance and status monitoring. The following sections will focus on defining and explaining the bits of these two object dictionaries.

5.4 State transitions of control operation in each mode

	Step	0	1	2	3	4	5	6	7	8
pattern	movement	Preparatory work	Init	Get the electricity	Firing	Enable	Start running	Deflection	Cease	Hitch
CSP pattern	0x6040	Establish communication	00h	06h	07h	0Fh	The 1F main station sends instructions	Main station control	Stop position command of the main station	-
	0x6041	OP status and activate NC axis	250h	231h	233h	1237h	1237h	1237h	1237h	238h
PP pattern	0x6040	Establish communication	00h	06h	07h	0Fh	-	2Fh~3Fh	10Fh	-
	0x6041	OP status and set motion parameters	250h	231h	233h	8237h	1237h	1237h	1637~1237h	1238h
PV pattern	0x6040	Establish communication	00h	06h	07h	0Fh	Enable and run	Change the speed	10Fh	-
	0x6041	OP status and set motion parameters	250h	231h	233h	1637h	1637h	1637h	1737h	1638h
HM pattern	0x6040	Establish communication	00h	06h	07h	0Fh	1Fh	of no avail	10Fh	-
	0x6041	OP status and set motion parameters	250h	231h	233h	8337h	237h	237h	737h	238h

Supplementary information for other positions:

When the PP mode changes its position, it is necessary to give the rising edge of Bit5 of the control word. That is, after the movement is in place, it needs to move to the next position. The 0x6040 control word must be given 0x2F first and then 0x3F before the new position movement can be started;

5.5 Return to the origin mode

The EC1 Series series drive products currently support 17-30,35, and 37 zero return modes. These modes require positive and negative limits and origin.

Among these, methods 17-18 are for positive and negative limit reset to zero, methods 19-22 are for origin reset to zero, methods 23-26 are for origin + positive limit reset to zero, methods 27-30 are for origin + negative limit reset to zero, and methods 35 and 37 use the current position as the zero point. Users should choose the appropriate reset-to-origin mode based on actual application needs.

5.5.1 Methods 17 and 18

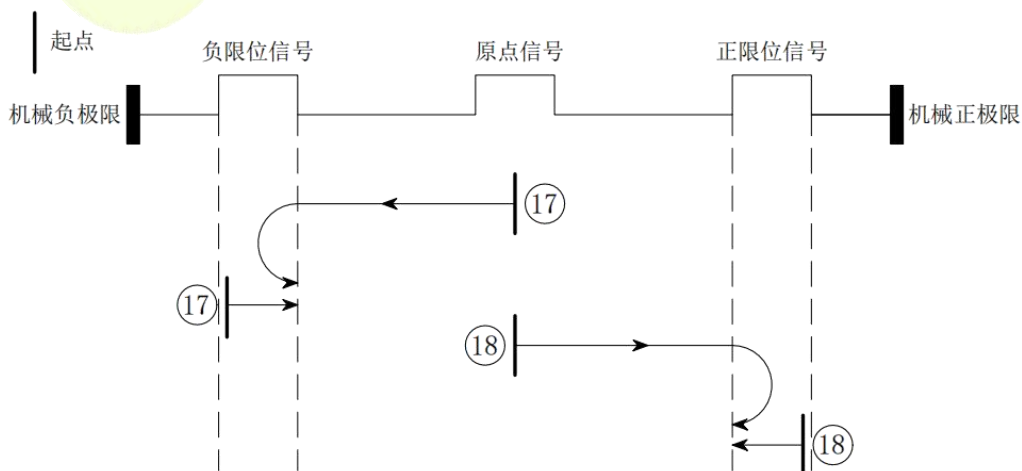
Mode 17 is "negative limit return to zero", and the stop position of the origin is at the negative limit signal.

The whole action of 'negative limit return to zero' is divided into two cases, as follows:

Situation A: After the driver receives the 'Return to Origin Enable Signal' command, it starts moving with parameters such as 'Return to Origin Speed V1' and 'Return to Origin Acceleration and Deceleration Time.' When it encounters the rising edge of a limit signal, it decelerates and stops. Then, it runs in the opposite direction at 'Return to Origin Speed V2' until it encounters the falling edge of a limit signal, at which point it decelerates and stops again. The entire zero-return operation is complete.

Case B: If the driver is within the limit after receiving the command of 'return to origin enable signal', it will start moving according to the parameters of 'return to origin speed V2' and 'return to origin acceleration and deceleration time'. When the falling edge of the limit signal is encountered, it will stop with deceleration, and the whole zero return action is completed.

Mode 18 is "positive limit return to zero", and the stop position of the origin is at the positive limit signal. Similar to mode 17, but different in the opposite direction of operation, which will not be explained in detail here.



Explain: “起点” is the starting point, “负极限信号” is the negative limit signal, “原点信号” is the origin signal, “正极限信号” is the positive limit signal.

5.5.2 Methods 19 and 20

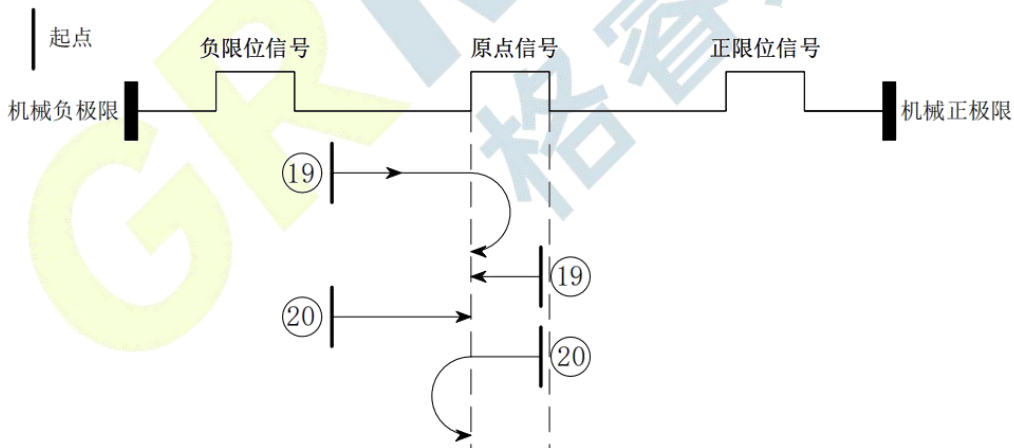
The origin stop position of mode 19 is on the left side of the rising edge of the origin signal in the positive direction.

The whole action of method 19 is divided into two cases as follows:

Situation A: After the driver receives the 'Return to Origin Enable Signal' command, it moves in the positive direction with parameters such as 'Return to Origin Speed V1' and 'Return to Origin Acceleration and Deceleration Time'. When it encounters the rising edge of the origin signal, it decelerates and stops. Then, it runs in the reverse direction at 'Return to Origin Speed V2', until it encounters the falling edge of the origin signal, at which point it decelerates and stops again. The entire zero-return action is completed.

Case B: If the driver is in the origin signal after receiving the 'origin enable signal' command, it will move in the opposite direction with several parameters such as 'origin return speed V2' and 'origin acceleration and deceleration time'. When it encounters the falling edge of the origin signal, it will stop decelerating, and the whole zero return action is completed.

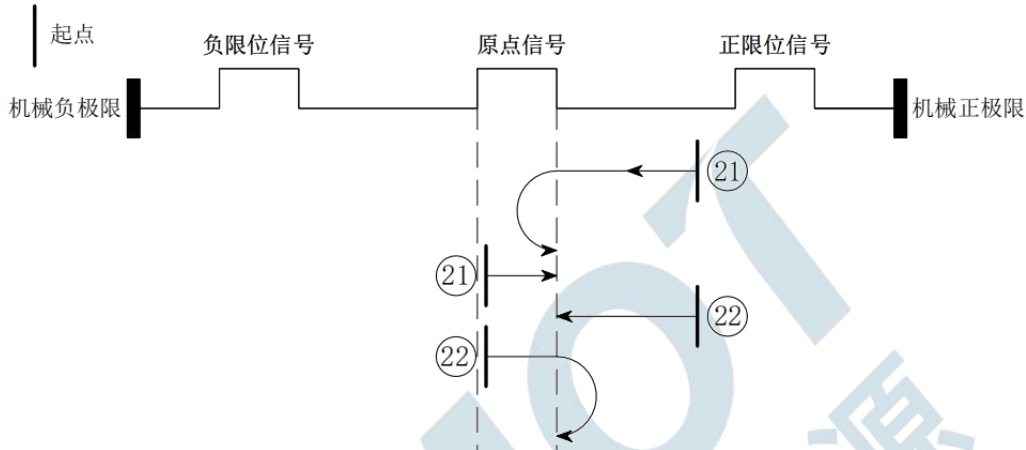
The origin stop position of mode 20 is on the right side of the rising edge of the origin signal in the positive direction, similar to mode 19, which will not be described in detail here.



Explain: “起点” is the starting point, “负极限信号” is the negative limit signal, “原点信号” is the origin signal, “正极限信号” is the positive limit signal.

5.5.3 Methods 21 and 22

The origin docking position of mode 21 is on the right side of the rising edge of the origin signal in the opposite direction, and the origin docking position of mode 22 is on the left side of the rising edge of the origin signal in the opposite direction. Similar to mode 21, it will not be described in detail here.



Explain: “起点” is the starting point, “负极限信号” is the negative limit signal, “原点信号” is the origin signal, “正极限信号” is the positive limit signal.

5.5.4 Methods 23 and 24

The origin stop position of mode 23 is on the left side of the rising edge of the origin signal in the positive direction.

The whole action of mode 23 is divided into three cases as follows:

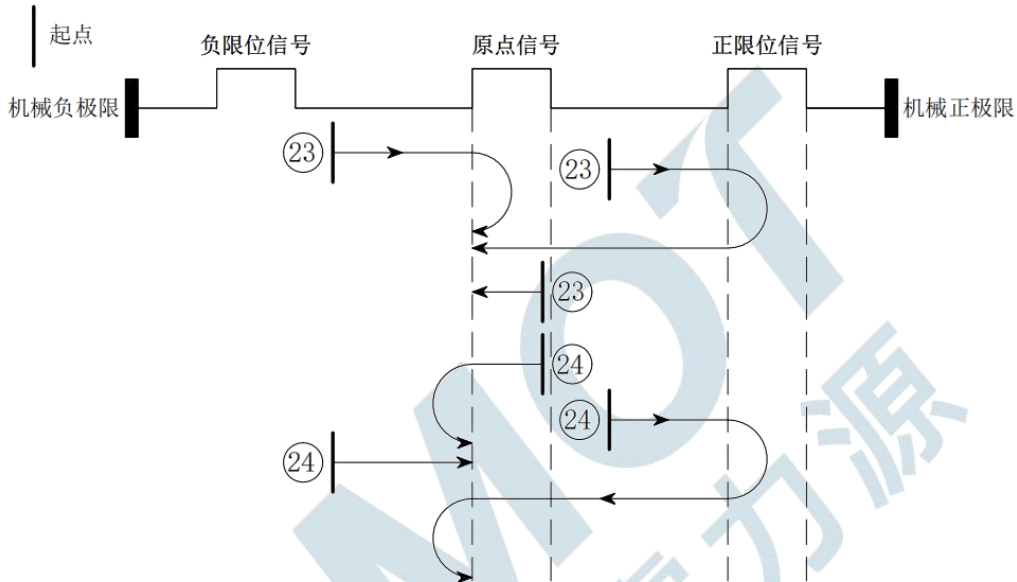
Situation A: After the driver receives the 'Origin Return Enable Signal' command, it moves in the positive direction with parameters such as 'Origin Return Speed V1' and 'Origin Return Acceleration and Deceleration Time'. When it encounters the rising edge of the origin signal, it decelerates and stops. Then, it runs in the reverse direction at 'Origin Return Speed V2', until it encounters the falling edge of the origin signal, at which point it decelerates and stops again. The entire zero-return action is completed.

Case B: After the driver receives the 'Return to Origin Enable Signal' command, it moves in the positive direction with parameters such as 'Return to Origin Speed V1' and 'Return to Origin Acceleration and Deceleration Time'. When it encounters the rising edge of the positive limit signal, it immediately stops. Then, it runs in the reverse direction at 'Return to Origin Speed V2', until it encounters the falling edge of the origin signal, at which point it decelerates and stops. The entire zero-return action is completed.

Case C: If the driver is in the origin signal after receiving the 'origin enable signal' command, it will move in

the opposite direction with several parameters such as 'origin return speed V2' and 'origin acceleration and deceleration time'. When it encounters the falling edge of the origin signal, it will stop decelerating, and the whole zero return action is completed.

The origin stop position of mode 24 is on the right side of the rising edge of the origin signal in the positive direction, similar to mode 23, and will not be described in detail here.



Explain: “起点” is the starting point, “负极限信号” is the negative limit signal, “原点信号” is the origin signal, “正极限信号” is the positive limit signal.

5.5.5 Methods 25 and 26

The origin stop position of mode 25 is on the left side of the descending edge of the origin signal in the positive direction.

The whole action of mode 25 is divided into three cases as follows:

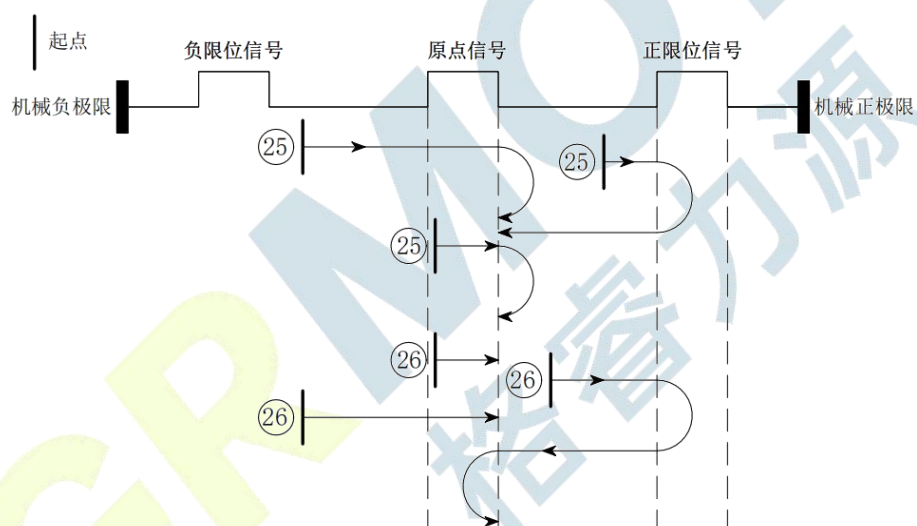
Situation A: After the driver receives the 'Return to Origin Enable Signal' command, it moves in the positive direction with parameters such as 'Return to Origin Speed V1' and 'Return to Origin Acceleration and Deceleration Time'. When it encounters the rising edge of the origin signal, it continues to run. Upon encountering the falling edge of the origin signal, it decelerates and stops. Then, it runs in the opposite direction at 'Return to Origin Speed V2', until it encounters the rising edge of the origin signal again, at which point it decelerates and stops. The entire zero-return operation is complete.

Case B: After the driver receives the 'Return to Origin Enable Signal' command, it moves in the positive direction with parameters such as 'Return to Origin Speed V1' and 'Return to Origin Acceleration and Deceleration

Time'. When it encounters the rising edge of the positive limit signal, it immediately stops. Then, it runs in the reverse direction at 'Return to Origin Speed V2', until it encounters the rising edge of the origin signal, at which point it decelerates and stops. The entire zero-return operation is complete.

Case C: After the driver receives the 'Return to Origin Enable Signal' command and is within the origin signal, it will move in the positive direction with parameters such as 'Return to Origin Speed V1' and 'Return to Origin Acceleration and Deceleration Time'. When it encounters the falling edge of the origin signal, it will decelerate and stop. Then, it will run in the reverse direction at 'Return to Origin Speed V2' until it encounters the rising edge of the origin signal, at which point it will decelerate and stop again. The entire zero-return action is complete.

The origin stop position of mode 26 is on the right side of the falling edge of the origin signal in the positive direction, similar to mode 25, and will not be described in detail here.

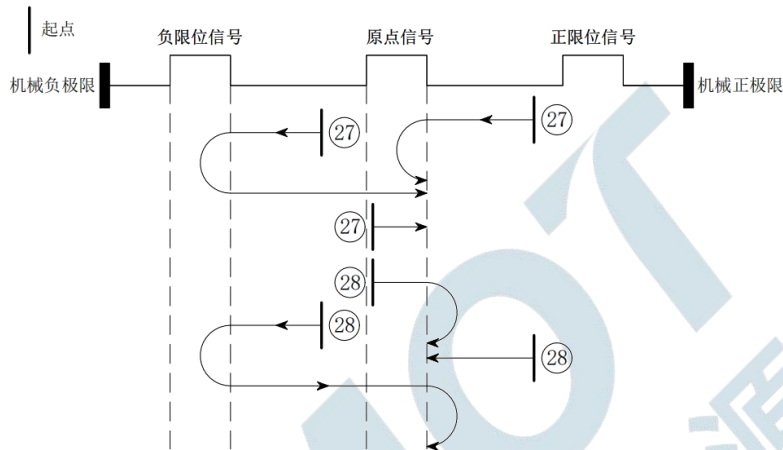


Explain: “起点” is the starting point, “负极限信号” is the negative limit signal, “原点信号” is the origin signal, “正极限信号” is the positive limit signal.

5.5.6 Methods 27 and 28

The origin stop position of mode 27 is on the right side of the rising edge of the origin signal in the opposite direction. The whole action is similar to mode 25, but the initial running direction is opposite.

The origin stop position of mode 28 is on the left side of the rising edge of the origin signal in the opposite direction. The whole action is similar to mode 26, but the initial running direction is opposite.

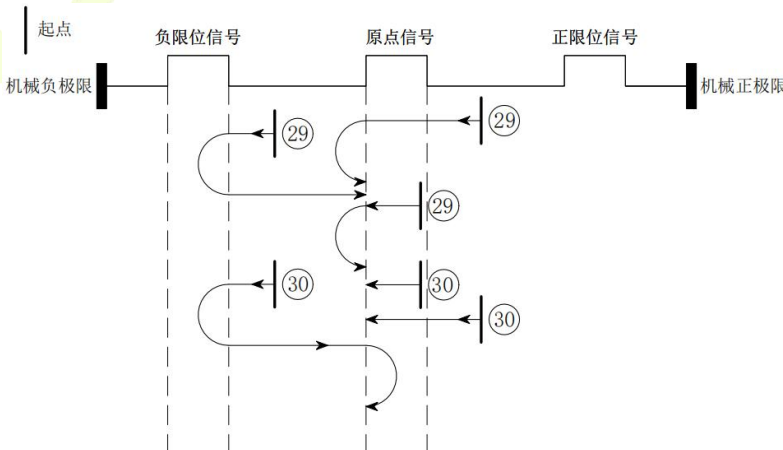


Explain: “起点” is the starting point, “负极限信号” is the negative limit signal, “原点信号” is the origin signal, “正极限信号” is the positive limit signal.

5.5.7 Methods 29 and 30

The origin stop position of mode 29 is on the right side of the falling edge of the origin signal in the opposite direction. The whole action is similar to that of mode 27, but the initial running direction is opposite.

The origin stop position of mode 30 is on the left side of the falling edge of the origin signal in the opposite direction. The whole action is similar to that of mode 28, but the initial running direction is opposite.



Explain: “起点” is the starting point, “负极限信号” is the negative limit signal, “原点信号” is the origin signal, “正极限信号” is the positive limit signal.

5.5.7 Method 35 and Method 37

Method 35 and 37 take the current position as the zero point.

6、Fault code and indicator light

6.1 Driver failure

0x603F/0x2707 Code	0x1001 Code	Can it be removed	Implication	Red light flashing	Green light flashing
0x2211	0x02	no	Over current	1	1
0x4211	0x04	no	Over voltage	1	2
0x5110	0x80	no	Phase A of the motor is missing	1	3
0x5120	0x80	no	Phase B of the motor is missing	1	4
0x7329	0x80	yes	Position limit error	1	5
0x8401	0x20	no	Position deviation	1	6
0x8402	0x20	yes	Command over speed	1	7
0x8403	0x20	yes	During the PWM cycle, the pulse increment is too large	1	8
0x5530	0x80	yes	EEPROM Parameter initialization error	3	1
0x5531	0x80	yes	EEPROM hardware error	3	2
0x5532	0x80	yes	Save communication parameter failure	3	3
0x5533	0x80	yes	Save the manufacturer parameter failure	3	4
0x5534	0x80	yes	Save the fault of parameter 402	3	5

Writing 1 to 0x2708 can clear the current alarm. Writing 0x2709 to 1 can clear the fault record, that is, clear the 0x2707 fault list;

6.2 ECAT alarm communication

According to the definition of the ECAT ALM status code, some error codes are listed below. The alarm code type is 0x82xx, and a unified LED flashing combination is adopted;

0x603F/0x2707 Code	0x1001 Code	Implication	Red light flashing	Green light flashing
0x8215	0x10	The BOOT mode configuration is invalid	4	1
0x8213	0x10	Nonsupport BOOT	4	1
0x8216	0x10	Invalid email configuration	4	1
0x8217	0x10	Invalid SM configuration	4	1
0x821B	0x10	The SM watchdog has timed out	4	1
0x821C	0x10	Invalid SM type	4	1
0x821D	0x10	Invalid output configuration	4	1
0x821E	0x10	Invalid input configuration	4	1

0x821F	0x10	Invalid watchdog configuration	4	1
0x821A	0x10	Synchronization mode error	4	1
0x8230	0x10	Invalid DC configuration	4	1
0x8232	0x10	DC PLL error	4	1
0x8233	0x10	DC synchronous I/O error	4	1
0x8234	0x10	DC synchronization timeout	4	1
0x8211	0x10	Invalid request for state change	4	1
0x8212	0x10	Unknown state change request	4	1
0x8221	0x10	The slave station requires the Init status	4	1
0x8222	0x10	The slave station requires the Pre-Op state	4	1
0x8223	0x10	The slave station requires the Safe-OP state	4	1

6.3 Fault-related handling

0x603F/0x2707 Alarm code: 0x3211, Bus Voltage over voltage and under voltage.

Reason	Confirmation method	Treatment measure
The power input of the driver is too low	Measure the voltage between the VDC and GND terminals of the driver	Make the drive operate within the specified voltage range.
The power input of the driver is too High		
The pump lift voltage of the driver is too high	/	Reduce acceleration and deceleration
The power cord of the driver is loose.	/	The wiring of the power cord of the driver is normal

0x603F/0x2707 Alarm code: 0x4211, The driver is overheating.

Reason	Confirmation method	Treatment measure
The driver is overloaded	/	Confirm the load size corresponding to the drive
The ambient temperature is too high	Use a thermometer to test the ambient temperature	Make the driver operate within the specified temperature range

0x603F/0x2707 Alarm code: 0x5110, 0x5120, Phase A and Phase B of the motor are missing.

Reason	Confirmation method	Treatment measure
Phase A or B of the motor is missing a phase	Confirm whether the wiring of the motor is correct	The wiring of the driver motor is normal

0x603F/0x2707 Alarm code: 0x7329, Position limit error.

Reason	Confirmation method	Treatment measure
CSP, PP, and PV modes, with hardware positive limit or hardware negative limit actions	View the bit0 and bit1 of 0x60FD through the upper computer or the main station	When the polarity of the driver IO input is consistent with the type of the external switch (normally open and normally closed), it is normal limit protection. Drive IO the polarity of the input with external switch type is not consistent, need to modify the IO drive input polarity or change with external switch type (normally open normally closed);
CSP, PP, PV modes, software positive limit or software negative limit actions	Check through the upper computer or the main station whether 0x6064 is within the range of 0x607D:01 and 0x607D:02	The software limit protection operates normally

0x603F/0x2707 Alarm code: 0x8402, Command over speed.

Reason	Confirmation method	Treatment measure
The driver subdivision does not correspond to the number of pulses per turn of the master station	Determine the number of single-turn pulses of the master station and the subdivision of the driver	The driver can be modified through the upper computer or the master station software to match the single-turn pulse count of the master station, or the single-turn pulse count of the master station can be modified to match the sub-pulse count of the driver
The synchronization cycle set by the master station is actually greater than the synchronization cycle of the drive's operation	Check the main size set on the synchronous cycle, and monitor size from station network synchronization cycle	Modify the main set of synchronous cycle, making it less than or equal to the synchronization of the drive cycle (or host or PC monitoring)

0x603F/0x2707 Alarm code: 0x8403, During the PWM cycle, the pulse increment is too large.

Reason	Confirmation method	Treatment measure
The acceleration of the drive is too large	/	Reduce the acceleration of the driver

0x603F/0x2707 Alarm code: 0x5530, 0x5531, 0x5532, 0x5533,0x5534, EEPROM Save parameter failure

Reason	Confirmation method	Treatment measure
Software anomaly	Can the factory Settings be restored	Restore the factory parameter Settings through the upper computer or the main station (0x1011)
The driver is damaged.	It can be saved several times repeatedly	Replace the new driver

0x603F/0x2707 Alarm code: 0x82xx, ECAT communication and alarm.

Reason	Confirmation method	Treatment measure
ECAT Communication anomaly	Whether the ESC main station is working properly; ESC host whether the number of control shaft within the prescribed scope; Cable connection is normal; XML file version is correct; The PDO channel set is normal; Working environment whether there is a big communication interference;	Switch to the ESC main station; ESC master station control shaft number within the prescribed scope; Use more than five classes and tape screened cable; XML file version is consistent; The PDO channel set correctly; The work environment is appropriate.

7、Serial port download parameter description

For details, please refer to the description in the document "EC1 Series Serial Port Download Communication Protocol Manual".

8、Warranty and after- sale service

8.1 Guarantee to keep sth. in good repair

8.1.1 Free warranty situation

Our company solemnly promises that for all products purchased from us, if any damage occurs during use due to the product's own fault, we will provide one-year free repair service. The round-trip shipping costs for the products will be shared equally by both parties.

8.1.2 Cases not covered by warranty

- (1) The driver was damaged due to the customer's own wiring error;
- (2) The driver was damaged because it exceeded the rated working voltage;
- (3) The driver was damaged when the DC power supply was connected to the AC power supply;
- (4) The driver was damaged because the customer's on-site environment was extremely harsh, such as being damp, extremely cold, or extremely hot, and the customer did not inform the company in advance, resulting in the driver's damage;
- (5) The customer disassembled the driver's casing or there were traces of the sequence label being torn off;

(6) 15 days after the customer confirmed receipt, the casing was obviously damaged or hit, causing the driver to be damaged; Unforeseen natural disasters, such as fires, earthquakes, tsunamis, typhoons, and other factors.

In all of the above cases, after evaluating the interests of all parties, our company will charge a certain amount for the repair costs. For all other cases, the repairs will be provided for free permanently.

8.2 Product replacement

8.2.1 Product malfunction replacement

For any faults that occur with the new product itself, our company offers a free replacement service for three months.

After our technical support staff confirm that it is a problem with the product itself, the product will be sent back to our company to avoid the time and postage costs of the round trip. Customers need to first send the faulty product by express or logistics. Once received by our company, we will immediately send another new product back to the customer.

Note: All our products undergo strict testing and aging procedures before being shipped out. Therefore, the occurrence of faults in new products is extremely rare. When operating, please carefully read the manual or consult our technical support staff. Or, our technical support staff can remotely assist you in the operation.

- **When returning goods, please pay attention to the following points:**

(1) Please ensure that the packaging is complete when returning the product to avoid any damage during transportation.

(2) When exchanging the product, make sure that all the accessories are intact.

(3) Each drive should be packaged separately in the original outer box to prevent any secondary damage to the product during transportation.

(4) If the drive is returned and tested and it is confirmed that it is not a product malfunction but rather a customer's operational mistake that mistakenly believed it was a drive failure, then our company will not bear the shipping cost (customer's operational mistakes include: damaging the drive due to incorrect wiring, mistakenly believing the drive is damaged due to poor wiring, and the drive not functioning properly due to incorrect operation, etc.).

8.2.2 Exchange due to non-product malfunction

If the customer is not satisfied with the appearance or functionality of the received product and wishes to exchange for a superior drive, they can apply for a replacement service to our company within one week after

receiving the product. After verification by our company, the product will be returned. Provided that the company confirms that the product returned is free from damage, all accessories are complete, and the packaging is in good condition, we will replace the product for the customer. For the replaced product, if there is a price difference during the process, the customer is required to make up for the difference.

Note: The replaced product will no longer be eligible for the non-product malfunction exchange service.

The round-trip shipping costs and other expenses incurred due to this exchange service will be borne by the customer!

8.3 Sales Return

Our company offers a 7-day return service for products with quality issues. If you notice any quality problems with the product within 7 days of receiving it (based on the actual date of customer's signature), please promptly communicate with our sales representatives or technical support personnel. After our technical support staff confirm that the problem is with the product itself, customers should then send the original complete product, its inner and outer packaging, accessories, and shipping label back to our company via express or logistics.

If, after our inspection and confirmation, the customer still insists on returning the product, the return shipping costs as well as all other related expenses will be borne by the customer themselves.

- **When returning the goods, please pay attention to the following points:**

- (1) Please contact the relevant department of our company to arrange the refund process.
- (2) The product must be in brand new condition and with intact packaging. Please return it to our company by express delivery or logistics.
- (3) Problems caused by the customer, such as damaged appearance or incomplete accessories, will not be accepted.

8.4 After sales service

If customers encounter technical problems while using this product, they can contact our company immediately. Please call our national toll-free service hotline: 0755-23206995.

9、Version Revision History

Version number	Explain	Change the deadline	Assign a person to review
V1.0.0	Initial version of EC1 Series series specification;	2025.6.20	LRQ/TCJ